

## Module XI: Genetics

### 1.1. Module Objectives

On completion of this module, the students will be able to:

- describe the connection between phenotypic and genotypic characteristics, in addition to the vertical and horizontal inheritance in microorganisms (naturally)
- explore and integrate the study of microbial phenotype and genotype in order to manipulate microorganisms as an effort of control or utilizing microorganisms to produce positive outcomes
- work with software to process bioinformatics data
- perform experiments that implement the connection between phenotypic and genotypic characteristics, as well as vertical and horizontal inheritance in microorganisms
- perform experiments involving the manipulation of genetics and expression of proteins in microorganisms
- describe and design the process of science and engineering of microbial genetics
- Gain initiative to voluntarily update on development of studies and data
- expand their networking through online activities

### 1.2. Module Data

Person in charge	Ernawati A.Giri-Rachman, PhD
Total Credits	5
Course	BM 2204 Microbial genetic engineering
Course Examination	Written Test

#### 1.2.1. Sub-module I: Microbial Genetic Engineering

Course Name:	Microbial genetic engineering
Course Level:	Undergraduate
Abbreviation, if applicable:	BM2204
Sub-heading, if applicable:	
Course included in the module, if applicable:	
Semester/term:	4
Course coordinator(s):	Ernawati A.Giri-Rachman, PhD; Azzania Fibriani, PhD
Lecturer(s):	to be determined in each semester
Language:	Bahasa Indonesia
Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Teaching format / class hours per week during the semester:	2 hours lectures and 3 hours laboratory
Workload	2 hours lectures, 3 hours laboratory, 2 hours structured activities, 2 hours individual study, 16 weeks per semester, and total 144 hours a semester
Workload Detail	Laboratory work, textbook reading assignment, group discussion, presentation, paper review

Classification within the curriculum:	General Studies / Compulsory Course/ Elective Course
Type of examination	Written test and hands on practical test
Language	Bahasa Indonesia
Course Target / Outcome	<p>After completion of this course students are expected to be able to:</p> <ul style="list-style-type: none"> <li>– describe isolation methods and characterize genes</li> <li>– describe methods of gene expression using expression systems in bacteria and fungi</li> <li>– describe methods of gene purification and characterize gene products</li> <li>– describe the connection between phenotypic and genotypic characteristics, in addition to the vertical and horizontal inheritance in microorganisms (naturally)</li> <li>– explore and integrate the study of microbial phenotype and genotype in order to manipulate microorganisms as an effort of control or utilizing microorganisms to produce positive outcomes</li> <li>– perform experiments that implement the connection between phenotypic and genotypic characteristics, as well as vertical and horizontal inheritance in microorganisms</li> <li>– perform experiments involving the manipulation of genetics and expression of proteins in microorganisms</li> <li>– describe and design the process of science and engineering of microbial genetics</li> </ul>
Teaching methods	Interactive Lecture and Interactive Laboratory Practices
Contents	<ul style="list-style-type: none"> <li>– Introduction of isolation and characterization genes and properties of nucleic acids</li> <li>– The applications of DNA replication and analysis methods (PCR methods, Real Time and Reverse Transkriptase PCR)</li> <li>– DNA protection mechanism and DNA recombinant technology</li> <li>– The application of plasmids in DNA recombinant technology</li> <li>– The function, process, and application of transposition</li> <li>– Natural and artificial transformation in bacteria and yeasts.</li> </ul>

	<ul style="list-style-type: none"><li>- Bacteriophages and Transduction</li><li>- The principles from DNA sequencing methods</li><li>- Mutation, mutagens, and DNA repair</li><li>- DNA recombination in bacteria: concept and application</li><li>- Methods of gene isolation and genomic libraries</li><li>- expression vectors in bacteria and yeasts</li><li>- Techniques in protein identification and purification</li><li>- Study-case presentation</li></ul>
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